

12th: Bangor, Maine, faint aurora at 11:00 p. m. Gardiner, Maine, bright auroral light, above a dark cloud, at 11 p. m.; beams at midnight; less brilliant at 1 a. m., of 13th. Alpena, Michigan, from 9:00 p. m. to 1:30 a. m. of the 13th; diffuse auroral light; at 10:20 p. m. vertical beams shot upward to an altitude of from 10° to 55°, with an apparent motion from east to west. Marquette, Michigan, from 9:30 to 9:40 p. m. faint. Duluth, Minnesota, from 10:00 to 11:10 p. m., faint aurora of whitish color. Tobacco Garden, Dakota, at 9:00 p. m.

13th: Eastport, Maine, 11:00 to 11:40 p. m., faint auroral arch of pale yellow. Gardiner, Maine, from 8:30 p. m. until 4:00 a. m. of the 14th; few streamers at 11:00 p. m. Newport, Vermont, during the evening. Cornish, Maine, visible all night. Burlington, Vermont, 9:00 to 11:40 p. m.; pale green auroral light, with streamers. Northfield, Minnesota, during the evening. Wicklow, Dakota, during the evening.

14th: Cambridge, Massachusetts, broken auroral arch at 10:00 p. m. Block Island, Rhode Island, brilliant auroral arch during the evening. Atco, New Jersey, low, bright arch, with dark cloud beneath. Cape May, New Jersey, 10:00 to 10:30 p. m., very faint. Tobacco Garden, Dakota, 9:30 p. m. Captain R. Karlowa, of the s. s. "Vandalia," of Hamburg, reported: 1st, in N. 40° 44', W. 63° 24', aurora obscured; arch extending from northwest to northeast, and to an altitude of 25°.

16th: Waterburg, New York, diffuse auroral light at 10:00 p. m. Lansing, Michigan, during the evening. Hastings, Michigan, during the evening. Franklin, Wisconsin, visible during the evening. Cresco, Iowa, faint auroral beams at 9:00 p. m., lasting thirty minutes. Tobacco Garden, Dakota, at 9:20 p. m. Fort Stevenson, Dakota, from 9:00 to 10:40 p. m. Escanaba, Michigan, at 10:00 p. m., pale green auroral light, with beams of reddish color, reaching nearly to the zenith.

17th: Portland, Maine, 9:00 to 9:20 p. m., faint. Cambridge, Massachusetts, aurora of limited extent close to the horizon, but quite bright at midnight. Auburn, New Hampshire, during the evening. Alpena, Michigan, from 9:00 to 11:00 p. m., diffuse auroral light. Escanaba, Michigan, 11:00 p. m., extending across the horizon, long beams shot upward at intervals.

18th: Eastport, Maine, at 11:40 p. m.; faint. Gardiner, Maine, 10:00 p. m. to 1:00 a. m. of the 19th; bright aurora, with streamers. Saint Vincent, Minnesota, 10:00 p. m. to 1:30 a. m. of the 19th; aurora of indistinct outlines, and pale yellow color.

19th: Morgantown, West Virginia, 10:25 to 11:25 p. m. Lafayette, Indiana, during the evening. Wicklow, Dakota, during the evening.

21st: Cambridge, Massachusetts, slight trace of aurora from 8:00 p. m. to 9:00 p. m. After the moon had set the aurora became brighter and a large bright band formed along the northern horizon, with its upper limit at an altitude of 15°. Mount Washington, New Hampshire, from 10:00 p. m. until morning of the 22d; pale aurora of yellowish color. Newport, Vermont, during the evening. Springfield, Massachusetts, from 11:00 p. m. until midnight. New Haven, Connecticut, from 10:30 p. m. until morning of the 22d. Cresco, Iowa, at 10:00 p. m. Fort Sisseton, Dakota, 9:00 p. m.; faint. Bismarck, Dakota, 10:00 p. m. Dayton, Washington Territory, 8:50 p. m. Saint Vincent, Minnesota, 9:00 p. m. to 4:00 a. m. of the 22d. Franklin, Wisconsin, during the evening. Fort Meade, Dakota, during the evening. Fort Yates, Dakota, during the evening. Moorhead, Minnesota, 9:00 p. m. until morning of the 22d.

THUNDER STORMS.

Thunder storms were reported in the various districts on the following dates:

New England: 2d, to 10th, 14th to 17th, 24th, 28th.

Middle Atlantic states: 1st, to 8th, 11th, 12th, 14th, 15th, 16th, 17th, 22d, 23d, 25th, 26, 27th, 28th, 31st.

South Atlantic states: 1st, to 6th, 8th, to 20th, 23d, to 31st.

Florida peninsula: 2d, 5th, 7th, 10th, 12th to 20th, 22d, 27th, 30th, 31st.

East Gulf states: 1st, to 14th, 16th, to 31st.

West Gulf states: 1st, to 19th, 21st, to 25th, 27th, to 31st.

Rio Grande valley: 3d, 5th, 6th, 7th, 9th, 10th, 14th, 15th, 18th, 26th, 27th, 29th, 31st.

Ohio valley and Tennessee: 1st, to 8th, 13th, to 18th, 20th, to 31st.

Lower lake region: 1st, to 8th, 10th, 11th, 14th, 15th, 16th, 21st, 22d, 23d, 25th, 26th.

Upper lake region: 1st, to 16th, 18th, 20th, 21st, 22d, 24th, 25th, 26th, 30th.

Extreme northwest: 10th, 12th, to 17th, 19th, 20th, 21st, 23d, to 28th.

Upper Mississippi valley: 1st, to 8th, 11th, 13th, to 16th, 20th, 22d, to 30th.

Missouri valley: 1st, 2d, 5th, to 8th, 11th, to 15th, 18th, to 24th, 26th, to 30th.

Northern slope: 2d, to 8th, 10th, 13th, to 21st, 24th, 26th, 27th, 28th.

Middle slope: 1st, 2d, 4th, 6th, 7th, 8th, 11th, to 15th, 20th, 22d, 23d, 24th.

Southern slope: 2d, 3d, 5th, 6th, 7th, 9th, 10th, 14th, to 22d, 24th, 27th.

Southern plateau: 1st, to 30th.

Middle plateau: 1st, 4th to 12th, 14th, 19th, 20th, 21st, 26th.

Northern plateau: 1st, 3d, 5th, to 10th, 12th, 16th.

South Pacific coast region: 8th, 9th, 20th.

North Pacific coast region: 1st, 8th, 10th.

During thunder-storms the following instances of damage by lightning have been reported:

Bangor, Maine: Several buildings were struck by lightning during the storm of the 15th.

Nashville, 15th: Several objects in the city were struck by lightning.

Stamford, Connecticut, 7th: Lightning struck several buildings, some of which were destroyed by fire.

Champaign, Illinois, 24th: A farmer living north of the city, while sitting with feet upon the stove during a storm, had his boots and pantaloons torn to shreds by lightning, and his feet and legs were badly burned.

Erie, 7th: House struck and badly damaged by lightning.

Milwaukee, 3d: Several buildings were struck and damaged by lightning. The schooner "Agnes Smith" was also struck, and sustained considerable damage.

Duluth, 24th: Telegraph instruments injured by lightning.

Santa Fe, 9th: House struck by lightning, and a child killed.

Port Jervis, New York, 7th: During thunder-storm a barn and its contents, valued at \$2,000, were destroyed by lightning near Montague.

During a heavy thunder-storm which occurred on the 9th, great damage was done at various places in the counties of Cumberland, Oxford, Somerset, Androscoggin, Kennebec and Franklin, Maine.

At Galveston, during the electric storm which occurred on the 5th, a house was struck by lightning and badly damaged, killing one person and two dogs. About five hundred yards distant another building was struck at the same time.

OPTICAL PHENOMENA.

SOLAR HALOS.

Solar halos have been observed in the various districts on the following dates:

New England: 1st, 2d, 4th, 5th, 12th, 14th, 22d, 27th, 31st.

Middle Atlantic states: 1st, 3d, 4th, 5th, 11th, 15th, 21st, 26th, 29th, 31st.

Ohio valley and Tennessee: 2d, 3d, 6th, 7th, 10th, 11th, 14th, 15th, 20th, 22d, 23d, 29th, 30th.

The Lake region: 14th, 15th, 19th, 21st, 26th, 30th.

Upper Mississippi valley: 3d, 7th, 11th, 15th, 23d.

Solar halos were also reported from the following stations not included in the districts named above:

Life-saving station No. 6, North Carolina, 22d, 29th.

Smithville, North Carolina, 31st.
 Augusta, Georgia, 4th.
 Pensacola, Florida, 1st, 3d.
 Vicksburg, Mississippi, 24th.
 Palestine, Texas, 6th, 7th, 10th, 12th, 25th.
 Little Rock, Arkansas, 24th.
 San Francisco, California, 9th, 10th.
 Lewiston, Idaho, 1st, 18th.
 Yates Centre, Kansas, 8th, 10th.
 Salina, Kansas, 12th.
 Creswell, Kansas, 9th.
 Campo, California, 5th.
 Albany, Oregon, 20th.

LUNAR HALOS.

Lunar halos have been observed in the various districts on the following dates:

New England: 1st, 2d, 4th, 21st, 22d, 25th, 27th, 28th, 29th.

Middle Atlantic states: 1st, 3d, 4th, 5th, 19th, 22d, 23d, 25th to 30th.

South Atlantic states: 1st, 2d, 21st, 22d, 25th, 26th, 28th to 31st.

East Gulf states: 21st, 22d, 24th, 25th, 26th, 28th.

West Gulf states: 20th, 21st, 24th, 25th.

Ohio valley and Tennessee: 1st, 2d, 4th, 22d to 29th, 31st.

Lower lake region: 1st, 11th, 20th, 22d, 25th, 27th to 30th.

Upper lake region: 21st, 24th, 26th, 27th, 31st.

Upper Mississippi valley: 2d, 23d to 27th, 31st.

Missouri valley: 20th, 21st, 27th, 28th, 30th.

Southern plateau: 6th, 23d, 25th, 26th, 28th.

Lunar halos were also reported from the following stations not included in the districts named above:

Cedar Keys, Florida, 27th.

Eagle Pass, Texas, 25th.

Umatilla, Oregon, 1st, 27th, 28th.

MISCELLANEOUS PHENOMENA.

SUNSETS.

The characteristic of the sky as indicative of fair or foul weather for the succeeding twenty-four hours, have been observed at all Signal Service stations. Reports from 185 stations show 5,674 observations to have been made, of which 14 were reported doubtful; of the remainder 5,660 there were 4,738, or 83.7 per cent., followed by the expected weather.

SUN SPOTS.

The following record of observations has been forwarded by Mr. D. P. Todd, Director of the Lawrence Observatory, Amherst, Mass.:

| DATE— Aug., 1882. | No. of new | | Disappeared by solar rotation. | | Reappeared by solar rotation. | | Total No. visible. | | REMARKS. |
|----------------------|------------|-------|--------------------------------------|-------|-------------------------------------|-------|-----------------------|-------|----------|
| | Gr'ps | Spots | Gr'ps | Spots | Gr'ps | Spots | Gr'ps | Spots | |
| 1, 10 a. m. | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 25† | |
| 4, 4 p. m. | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 12 | |
| 5, 4 p. m. | 0 | 0 | 0 | 2 | 0 | 0 | 1 | 10 | |
| 6, 11 a. m. | 0 | 0 | 0 | 5 | 0 | 0 | 1 | 5 | |
| 9, 9 a. m. | 3 | 10 | 1 | 5 | 2 | 5 | 3 | 10 | |
| 10, 4 p. m. | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 10 | |
| 11, 10 a. m. | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 10 | |
| 13, 11 a. m. | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 10 | |
| 16, 10 a. m. | 0 | 0 | 0 | 3 | 0 | 0 | 3 | 7 | |
| 16, 1 p. m. | 0 | 0 | 2 | 5 | 0 | 0 | 1 | 2 | |
| 17, 1 p. m. | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | |
| 18, 12 m. | 3 | 8 | 0 | 0 | 2 | 5 | 4 | 10 | |
| 19, 9 a. m. | 1 | 10 | 0 | 0 | 0 | 5 | 5 | 20† | |
| 20, 2 p. m. | 0 | 10† | 0 | 0 | 0 | 0 | 5 | 35† | |
| 21, 12 m. | 0 | 0 | 1 | 1 | 0 | 0 | 4 | 35† | |
| 22, 4 p. m. | 2 | 5 | 0 | 0 | 2 | 5 | 6 | 40† | |
| 24, 3 p. m. | 0 | 0 | 2 | 10 | 0 | 0 | 4 | 30† | |
| 25, 5 p. m. | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 30† | |
| 26, 1 p. m. | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 20† | |
| 28, 8 a. m. | 0 | 0 | 0 | 5 | 0 | 0 | 4 | 15† | |
| 29, 8 a. m. | 1 | 10 | 0 | 5 | 0 | 0 | 5 | 20† | |
| 30, 2 p. m. | 0 | 0 | 2 | 10 | 0 | 0 | 3 | 10† | |
| 31, 10 a. m. | 1 | 1 | 0 | 0 | 1 | 1 | 4 | 10† | |

† Approximated. Faculae were seen at the time of every observation.

Mr. H. D. Govey, at North Lewisburg, Ohio, reports: Sun-spots were observed on all clear days during the month. They were least numerous on the 7th, largest on the 11th, and most

numerous on 23d. Mr. David Trowbridge, at Waterburg, New York, reports: 3rd, one group, six spots. 6th, one group, one spot; faculae. 10th, three groups, five spots; probably two of the groups have appeared by rotation; the group of the 3d has disappeared by rotation; faculae. 11th, three spots, (same as 10th,) six spots; faculae. 12th, two groups, three spots; one group of the 11th gone out. 14th, two groups, three spots (same as 12th). 16th, one group, one spot; one of the groups of the 14th, has disappeared by rotation. 17th, one group, one spot (same as 16th). 18th, three groups, five spots; one group has appeared by rotation and one group has arisen. 19th, five groups, ten spots; two new groups have arisen. 20th, three groups, eleven spots; one group has disappeared by rotation. 21st, three groups, (same as 20th), nine spots. 22d, three groups, nine spots (same as 21st). 24th, two groups, four spots. 25th, three groups, eight spots. 28th, three groups, five spots. 29th, three groups, five spots. 30th, two groups, four spots. Of the spots seen on the 29th, but one can now be seen. The large group has disappeared by rotation; a faint group has arisen; and one group has gone out.

Captain John Carroll, of the s. s. "Hewelius," reported: Buenos Ayres, 10th. Observed a long black spot on the sun's disk. On the 20th, in S. 22°, W. 40°, observed one long black spot. From 21st to 25th two spots were observed. 26th, spots disappeared.

The following record of observations has been forwarded by Mr. A. S. Bender, of Sacramento, California:

| DATE— Aug., 1882. | No. of new | | Disappeared by rotation | | Reappeared by rotation. | | Total No. of | | REMARKS. |
|----------------------|------------|-------|----------------------------|-------|----------------------------|-------|--------------|-------|--|
| | Gr'ps | Spots | Gr'ps | Spots | Gr'ps | Spots | Gr'ps | Spots | |
| 1, 4 p. m. | ..... | ..... | ..... | ..... | ..... | ..... | 1 | 40* | |
| 3, 4 p. m. | ..... | ..... | ..... | ..... | ..... | ..... | 1 | 30* | Some spots coalesced, some disappeared. |
| 4, 4 p. m. | ..... | ..... | ..... | ..... | ..... | ..... | 1 | 15* | |
| 7, 4 p. m. | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | Seems clear of spots. |
| 9, 4 p. m. | 2 | 25 | ..... | ..... | 1 | 1 | 3 | 25 | New spots broke out; one group of single spot, and one of several. |
| 10, 4 p. m. | ..... | ..... | ..... | ..... | ..... | ..... | 3 | 10 | Spots coalesced or disappeared. |
| 12, 4 p. m. | 1 | 2 | ..... | ..... | ..... | ..... | 4 | 10 | Do. |
| 13, 4 p. m. | ..... | ..... | 1 | 2 | ..... | ..... | 3 | 8 | |
| 15, 4 p. m. | ..... | ..... | 1 | 3 | ..... | ..... | 2 | 6 | One group disappeared. |
| 16, 4 p. m. | ..... | ..... | ..... | ..... | ..... | ..... | 1 | 3 | |
| 17, 4 p. m. | ..... | ..... | ..... | ..... | 1 | 1 | 2 | 4 | |
| 18, 4 p. m. | 2 | 5 | ..... | ..... | ..... | ..... | 4 | 9* | Perhaps the new groups may be but one. |
| 19, 4 p. m. | 1 | 5 | ..... | ..... | ..... | ..... | 5 | 20* | |
| 21, 4 p. m. | 1 | 1 | ..... | ..... | ..... | ..... | 5 | 50* | Entire change of groups and great increase of spots. |
| 23, 4 p. m. | ..... | ..... | ..... | ..... | ..... | ..... | 5 | 45* | One group partly disappeared by rotation. |
| 24, 4 p. m. | 1 | 1 | 1 | 20 | ..... | ..... | 3 | 20* | Rest of group disappeared by rotation. |
| 25, 4 p. m. | 1 | 5 | ..... | ..... | ..... | ..... | 4 | 25* | This group appeared near center of lower section. |
| 26, 4 p. m. | ..... | ..... | ..... | ..... | ..... | ..... | 4 | 15* | Some spots grown dim or disappeared. |
| 29, 4 p. m. | ..... | ..... | 1 | 5 | ..... | ..... | 3 | 10* | Some spots very dim. |
| 30, 4 p. m. | ..... | ..... | ..... | ..... | ..... | ..... | 3 | 10* | |
| 31, 4 p. m. | ..... | ..... | ..... | ..... | ..... | ..... | 3 | 10* | |

* Estimated.

METEORS.

New London, Connecticut, 8th: At 10:00 p. m., a brilliant meteor was observed, which for a short while, illuminated the whole heavens. It suddenly disappeared leaving a small cloud which remained visible for about three minutes. On the 12th, at 1:00 a. m., a similar meteor was observed. It left no cloud, but a sharp detonation of two seconds duration was distinctly heard after its disappearance. Numerous shooting stars were observed on the evening of the 17th.

Manasquan, New Jersey, 6th: Numerous meteors were observed during the evening. At 9:36 p. m., a meteor of unusual brilliancy appeared in the eastern sky, and pursued a northerly course, parallel to the horizon. It was of bright red color and the light was sufficient to cast well defined shadows. Before disappearing it exploded like a rocket.

Freehold, New Jersey, 10th: More than thirty were meteors observed between 9:00 and 10:00 p. m.; several were seen on